

WHAT IS CLAIMED IS:

1. A passive optical network system comprising a central office, a local office, and a plurality of subscriber terminals, the central office and the local office being
5 connected with each other through an optical fiber, the subscriber terminals being connected with the local office, the central office providing optical communication service to the subscriber terminals through the local office, the central office comprising:
 - a broadcasting optical source that outputs broadcasting optical signals that provide a broadcasting service to the subscriber terminals;
 - 10 a pumping optical source that outputs pumping optical signals that amplify the broadcasting optical signals output from the broadcasting optical source;
 - a downstream optical source that outputs downstream optical signals that provide a downstream data service to the subscriber terminals;
 - an upstream optical receiver that receives upstream data service signals transmitted
15 from the subscriber terminals and then converts the received signals into electric signals; and
 - a wavelength division multiplexer that multiplexes the broadcasting optical signals output from the broadcasting optical source, the pumping optical signals output from the pumping optical source, and the downstream optical signals output from the downstream
20 optical source, such that the multiplexed signals are output, the wavelength division multiplexer filtering input upstream data service signals, such that the filtered signals are output to the upstream optical receiver.

2. The passive optical network system of claim 1, wherein the central office further comprises an optical amplifier that amplifies the downstream signals output from the wavelength division multiplexer and the upstream data service signals input to the
5 wavelength division multiplexer.

3. The passive optical network system of claim 2, wherein the optical amplifier is an erbium-doped fiber amplifier.

10 4. A passive optical network system comprising a central office, a local office, and a plurality of subscriber terminals, the central office and the local office being connected to each other through an optical fiber, the subscriber terminals being connected to the local office, the central office providing optical communication service to the subscriber terminals through the local office, the central office comprising:

15 a plurality of broadcasting optical sources that output different wavelengths of broadcasting optical signals to provide multi-channel broadcasting service to the subscriber terminals;

a first wavelength division multiplexer that multiplexes the broadcasting optical signals output from the broadcasting optical sources;

20 a pumping optical source that outputs pumping optical signals to amplify the broadcasting optical signals output from the plurality of broadcasting optical sources;

a downstream optical source that outputs downstream optical signals to provide

downstream data service to the subscriber terminals;

an upstream optical receiver which receives upstream data service signals transmitted from the subscriber terminals, such that the received signals are converted into electric signals; and

5 a second wavelength division multiplexer that multiplexes the broadcasting optical signals multiplexed by the first wavelength division multiplexer, the pumping optical signals output from the pumping optical source, and the downstream optical signals output from the downstream optical source, such that the multiplexed signals are output, the second wavelength division multiplexer filtering input upstream data service signals, such
10 that the filtered signals are output to the upstream optical receiver.

5. The passive optical network system of claim 4, wherein the central office further comprises:

an optical amplifier that amplifies downstream signals output from the second
15 wavelength division multiplexer and upstream signals input to the second wavelength division multiplexer.

6. The passive optical network system of claim 5, wherein the optical amplifier is an erbium-doped fiber amplifier.

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7. A passive optical network system comprising a central office, a local office, and a plurality of subscriber terminals, the central office and the local office being connected to each other through an optical fiber, the subscriber terminals being connected to the local office, the central office providing optical communication service to the
 5 subscriber terminals through the local office, the central office comprising:

a plurality of broadcasting optical sources that output different wavelengths of broadcasting optical signals to provide multi-channel broadcasting service to the subscriber terminals;

a first wavelength division multiplexer that multiplexes the broadcasting optical
 10 signals output from the broadcasting optical sources;

a pumping optical source that outputs pumping optical signals that amplify the broadcasting optical signals output from the broadcasting optical sources;

a plurality of downstream optical sources that output different wavelengths of downstream optical signals that provide downstream data service to the subscriber
 15 terminals;

a second wavelength division multiplexer that multiplexes the downstream optical signals output from the downstream optical sources;

an upstream optical receiver that receives upstream data service signals transmitted from the subscriber terminals, such that the received signals are converted into electric
 20 signals; and

a third wavelength division multiplexer that multiplexes the broadcasting optical signals multiplexed by the first wavelength division multiplexer, the downstream optical

signals multiplexed by the second wavelength division multiplexer, and the pumping optical signals output from the pumping optical source, such that the multiplexed signals are output, the third wavelength division multiplexer filtering input upstream data service signals, such that the filtered signals are output to the upstream optical receiver.

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8. The passive optical network system of claim 7, wherein the central office further comprises:

an optical amplifier that amplifies downstream signals output from the third wavelength division multiplexer and upstream signals input to the third wavelength

10 division multiplexer.

9. The passive optical network system of claim 8, wherein the optical amplifier is an erbium-doped fiber amplifier.

15 10. A passive optical network system comprising a central office, a local office, and a plurality of subscriber terminals, the local office and the central office being connected to each other through an optical fiber, the subscriber terminals being connected to the local office, the central office providing optical communication service to the subscriber terminals through the local office, the local office comprising:

20 a first wavelength division multiplexer that receives multiplexed signals including pumping optical signals from the central office, and divides downstream optical signals for downstream data service, broadcasting optical signals for broadcasting service and the

pumping optical signals by demultiplexing the multiplexed signals, the first wavelength division multiplexer multiplexing upstream data service signals transmitted from the subscriber terminals;

an optical amplifier media that receives the broadcasting optical signals and the
5 pumping optical signals from the first wavelength division multiplexer, such the broadcasting optical signals are amplified by the pumping optical signals;

a second wavelength division multiplexer that multiplexes the broadcasting optical signals amplified by the optical amplifier media and the downstream optical signals divided by the first wavelength division multiplexer, the second wavelength division multiplexer
10 demultiplexing the upstream data service signals transmitted from the subscriber terminals; and

an optical divider coupler that divides the multiplexed optical signals transmitted from the second wavelength division multiplexer, so as to distribute the divided signals to the subscriber terminals, the optical divider coupler coupling the upstream data service
15 signals transmitted from the subscriber terminals.

11. The passive optical network system of claim 10, wherein the optical amplifier media is an erbium-doped fiber amplifier.

20 12. A passive optical network system comprising a central office, a local office, and a plurality of subscriber terminals, the subscriber terminals being connected to the local office through an optical fiber, the central office and the local office being

connected to each other, the central office providing optical communication service to the subscriber terminals through the local office, the subscriber terminals comprising:

a wavelength division multiplexer that demultiplexes multiplexed optical signals transmitted downstream from the local office, such that downstream optical signals are
5 divided for downstream data service and broadcasting optical signals are divided for broadcasting service, the wavelength division multiplexer multiplexing upstream data service signals for transmission from the subscriber terminals to the local office;

at least one downstream data optical receiver that receives the downstream optical signals divided by the wavelength division multiplexer, such that the received optical
10 signals are converted into electric signals;

at least one broadcasting data optical receiver that receives the broadcasting optical signals divided by the wavelength division multiplexer, such that the received optical signals are converted into electric signals; and

an upstream optical source that generates upstream data service signals to be
15 transmitted to the local office through the wavelength division multiplexer.

13. The passive optical network system of claim 12, wherein the central office further comprises an optical amplifier that amplifies the downstream signals output from the wavelength division multiplexer and the upstream data service signals input to the
20 wavelength division multiplexer.

14. The passive optical network system of claim 13, wherein the optical amplifier is an erbium-doped fiber amplifier.